Chronology
Washington Avenue Tunnel Project
City of Kingston, Ulster County, New York

Historical Context

On or around 1911 the construction of the Washington Avenue Tunnel was completed, beginning at the Washington Avenue/Lucas Avenue intersection and discharging to the Twaalfskill Brook at the Wilbur Avenue/Gilead Street intersection. This tunnel was constructed by the New York City Board of Water Supply in order redirect the discharge of combined sewage originating in the Uptown Kingston Area from the Esopus Creek to the Rondout Creek for the purposes of enhanced assimilation into the environment as a result of the anticipated diminishment of the Esopus Creek flows due to impoundment for water supply purposes at the Ashokan Reservoir.

The tunnel varies in depth according to the overlying topography, but generally speaking, has a depth of roughly 80 feet. Portions of the tunnel were constructed wholly in rock, other portions in earth where the overlying earth profile was temporarily supported by timber cribbing while the tunnel was constructed below utilizing concrete for the floor and brick for the walls and arch roof.

Over the years, several vertical shafts were installed to direct sanitary sewerage into the tunnel invert from areas of the City not otherwise easily serviced, Pettit Avenue; or to reduce surcharging in existing service mains, Elizabeth Street and Main Street. Later, portions of the sanitary sewer invert were "capped" to allow the future introduction of separated stormwater into a separate "upper chamber" within the original cross-section of the Tunnel. Three stormwater shafts discharging to the Tunnel's "stormwater chamber" were developed over the years to address localized flooding; one at Greenkill Avenue, one at Elizabeth Street and the third at the Tannery Brook crossing.

The current sinkhole site is adjacent to the Tannery Brook stormwater shaft. Throughout the length of the Tunnel, construction progressed through various rock/soil profiles. In 1948 a Field Tour of the length of the Washington Avenue Tunnel was made by then City Engineer A.F. Hallinan, during which time tunnel construction in the area of the Tannery Brook Shaft was described by a Mr. Cragan as "passing from a rock section to a clay section thru which the tunnel was laid in a shield under pressure" for a length of "200 to 300 feet of muck … before coming to another rock section." These difficult soils have lead, over the years, to tunnel settlement, subsequent localized structural failures and ultimately soil loss into the tunnel, creating the sinkhole above.

Introduction

Washington Avenue is a primary north-south traffic route through the City of Kingston connecting the New York State Thruway (Route 87) traffic-circle with Route 32, and carries an average daily traffic volume of approximately 7,500 vehicles. The severe rainfall events experienced during the period April 26 - May 8, 2011 and the previously undetected soil loss into the Tunnel below the southbound lane of Washington Avenue in the vicinity of the Tannery

Brook Shaft lead to the road subsidence and eventual closure of Washington Avenue between Linderman Avenue and Burhans Boulevard.

Over the past several years we have responded to several Tunnel deficiencies that have expressed themselves in ways visible and invisible to the public, including the well-publicized collapse of Washington Avenue, but also including a major sewer collapse off Gilead Street, internal repairs to the Tunnel not associated with the collapse that include sealing of major groundwater leaks, and structural repairs to the Originating Manhole and Tunnel Transition at Lucas Avenue.

Chronology

Listed below is a chronology of steps the City of Kingston undertook to address the Washington Avenue subsidence problem:

April 26 – May 8, 2011	Severe storms in the City of Kingston.
May 2011	City of Kingston DPW makes temporary repairs to the Washington Avenue roadway that had subsided. City of Kingston Water Department repairs water service connection problems as a result of subsidence. City of Kingston retains Brinnier and Larios, P.C. for engineering support to evaluate and develop repair alternatives.
May 13, 2011	GroutTech Inc. contracted to fill subsurface voids with grout in the affected area and seal leaks in the underlying rock.
May 24, 2011	The six inch (6") diameter water distribution main located below the Washington Avenue roadbed separated, and temporarily removed from the subsidence area and isolated with a new 6" valve.
June 8, 2011	Due to ongoing subsidence of the Washington Avenue roadway, the City of Kingston closes Washington Avenue to traffic. A detour plan with signage was installed.
June 10, 2011	Merritt Construction contracted to install steel sheeting for the purpose of protecting the 16" water transmission main from being undermined by the subsidence problem. A second row of shallow steel sheeting was installed across the Tannery Brook to cutoff the pathway for any underground waters flowing into the subsidence area.
June 14, 2011	Soil and Material Testing Inc. contracted to install one soil boring in the subsidence area to gather subsurface soil and groundwater information.
June 20, 2011	Geotechnical and hydrogeologic consultants were retained to evaluate the complex subsurface soil conditions found by the soil boring.
June 27, 2011	City of Kingston Water Department reroutes the 6" diameter water main behind the steel sheeting to re-establish the local 6" distribution main.
July 1, 2011	Merritt Construction contracted to replace asphalt pavement on portions of Washington Avenue in order to open one lane of traffic.
July thru	Subsidence area monitored for evidence of ongoing subsidence via

August, 2011	weekly field elevation surveys, one traffic lane along with the Washington Avenue traffic detour.
July, 2011	Remote video inspection of the affected length of the Washington Avenue Tunnel to ascertain status and help to formulate the scope of work of additional subsurface investigations.
May, 2012	Washington Avenue Tunnel manned entry for further localized inspections and the installation of steel plating at the headwall opening to the upstream, sanitary sewer.
	Cone Penetration testing completed to identify underlying soils, soil density, groundwater elevations and depth to bedrock.
June, 2012	Pre-purchase of "Link Pipe" liner panels
July, 2012	Remote video inspection, construction bid advertisement.
August, 2012	Washington Avenue collapse and the initiation of emergency response; Merritt Construction is awarded the work to remove sediment and reline 175 lineal feet of stormwater conduit between the Tannery Brook Shaft and downstream rock tunnel.
	Economic Development Agency Grant Application in the amount of $1.4M to be given further consideration.
December, 2012	Economic Development Agency Grant Awarded.
February, 2013	Monitoring wells installed and soil bores taken, including bedrock cores, to support future engineering design.
March, 2013	Public solicitation for Engineering Proposals for the EDA approved Project.
May, 2013	Engineering Proposals received, reviewed and evaluated, and an engineering award recommendation approved.
	Engineering contract with GEA Engineering is signed by Mayor Gallo; design begins.
June, 2013	The contract with Precision Industrial Maintenance to reline the 24" diameter sanitary sewer underlying the newly relined stormwater conduit between the Tannery Brook Shaft and downstream rock tunnel is signed by Mayor Gallo.
July, 2013	Gilead Street sewer collapse, emergency declared.
August, 2013	Gilead Street sewer repairs completed.

September, 2013	Jet Grouted Arch design proposal submitted for approval, however the Common Council asks for a Peer Review prior to proceeding.
October, 2013	The contract with Brierley Associates for the peer review is signed by Mayor Gallo.
February, 2014	Final recommendations from Brierley Associates are received, and a meeting conducted to discuss alternatives. A presentation is made to a Special Finance Committee Meeting to make our final recommendations for design.
June, 2014	Design for the Jet Grouted Arch and Piping Improvements is complete, and easement maps and descriptions are requested.
September, 2014	Meeting to discuss easements takes place at the Washington Avenue Hudson Valley senior Residence.
October, 2014	Redesign at Hewitt Place to eliminate the need for three easements at the request of impacted residents.
October, 2014 thru January, 2015	Easement acquisition continues.
November, 2014	Washington Avenue Tunnel Sanitary Manhole #3B-3 Repairs bid, no bids received.
January, 2015	Washington Avenue Tunnel Sanitary Manhole #3B-3 Repairs re-bid, bids due February 5, 2015.
January 25, 2015	The Washington Avenue “Sinkhole” Project is out to bid; we hope to award both components of the Project in April, with a construction start of May 1, 2015, and Substantial completion by December 31, 2015.